

REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 2, 3, and 5 are pending in the present application; Claims 1 and 4 having been canceled and Claims 2, 3 and 5 having been amended by way of the present amendment.

In the outstanding Office Action, the Abstract was objected to, and Claims 2, 3, and 5 were rejected under 35 U.S.C. §103(a) as being unpatentable over Takada et al. in view of Komai et al.

In response to the objection to the Abstract, the Abstract has been amended to be less than 150 words.

Accordingly, the objection to the Abstract is respectfully requested to be withdrawn.

Claims 1 and 4 have been canceled as being directed towards a non-elected invention.

Claims 2, 3, and 5 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Takada et al. in view of Komai et al. This rejection is respectfully traversed.

Claim 2 has been amended to:

clarify the process for producing an electronic component by assigning ordinal numbers of the process;

clarify that (in a second step) a first electroplating is deposited by using the wiring layer as an electrode until the core material protruding from [exposed on] the inner wall surface of the via hole is covered;

clarify that a conductor part is formed in the via hole by stacking three layers in order from a wiring-layer side: the first electroplating layer; the electroless plating layer; and the second electroplating layer; and

revise the term "conductor layer" as --wiring layer-- which is based on the description of "wiring layer 14," for example, in page 14, lines 5-10 of the specification.

The amendment to Claim 2 is supported by page 13, line 9 to page 15, line 5 of the specification.

Claim 3 is amended to clarify that a laser beam is applied onto the base material with a power of the laser beam adjusted in view of a difference in melting temperature between resin forming the base material and the core material such that the core material protrudes from the inner wall surface of the via hole, to thereby form an anchor structure with respect to the conductor part. This amendment to Claim 3 is based on page 17, lines 20-27 of the specification.

The outstanding Office Action asserts that the claimed invention is obvious in view of Takada and Komai et al. This Office Action makes the following assertions in the rejection set forth on pages 2 and 3 of the Office Action:

The core material encroaches in to the conductive layer so that conductive layer is strongly adhered to the hole (Takada et al., Column 40, lines 39-43);

The conductive layer is formed by electrode plating because electrode plating is fast to fill the hole (Komai et al., Column 10, lines 19-21);

The inner wall surface of the hole is electroless plated because electroless plating reducing stress in the plated through hole (Komai et al., Column 10, lines 24-29); and

The electrode plating does not contact the core material because the core material is already covered by the plated conductive layer.

However, in the configuration of the conductor part having a three-layer configuration: the first electroplating layer; the electroless plating layer; and the second electroplating layer, Takada et al. and Komai et al. do not disclose nor suggest the specific feature of the present invention, that is, the process for producing an electronic component:

The second step to deposit a first electroplating by using the wiring layer as an electrode until the core material protruding from the inner wall surface of the via hole is covered;

The third step to form an electroless plating layer in close contact with an inner wall surface of the via hole and without contacting the core material; and

The fourth step to deposit a second electroplating by using the conductor layer as an electrode to cover the electroless plating layer.

Accordingly, one of ordinary skill in the art would not find obvious the features of the claimed invention based on the combination of Takada et al. and Komai et al.

A comparison of the via hole having a multilayer structure of the present invention and Komai et al. is illustrated in the following table.

	Present invention	Komai et al.		
1	Wiring layer 14	Lower layer interconnect 24	Cu	Electroplating
2	First electroplating 20	Lower portion 33	Cu/W,Al	Electroless plating/CVD
3	Electroless plating layer 22	Seed layer 34	Cu	DC magnetron sputtering
4	Second electroplating 24	Upper portion 35	Cu	Electroplating

The above table clearly shows that the layer structure is different between the present invention and Komai et al. Further, as is described in column 5, lines 7-19 and column 8, lines 34-47 of Komai et al., the process of the formation of the multilayer structure in Komai et al. is obviously different from the present invention.

Further, Takada et al. and Komai et al. do not recognize the problems to be solved by the present invention:

(page 10, line 19 to page 11, line 7 of the specification) when electroplating is conducted using the conductor layer as an electrode, plating grows from the conductor layer side; when an electroless plating layer has been formed previously on the inner wall surface of the via hole, electricity also flows through this electroless plating layer, and there is a fear of an increase in plating thickness in an edge portion where electric field concentration is likely to occur, that is, in the opening edge portion of the via hole and the core material portion protruding

from the inner wall surface of the via hole. When, as a result of this increase in plating thickness, the opening of the via hole is blocked, and voids are generated in the conductor part, the resistance value of the conductor part increases or the heat dissipation property deteriorates.

Accordingly, Claim 2 is patentable over the prior art.

Moreover, Takada et al. and Komai et al. do not disclose the feature of the amended claim 3 that a laser beam is applied onto the base material with a power of the laser beam adjusted in view of a difference in melting temperature between resin forming the base material and the core material such that the core material protrudes from the inner wall surface of the via hole, to thereby form an anchor structure with respect to the conductor part.

Therefore, Claim 3 is patentable over the prior art.

Claim 5 is patentable for at least the reasons Claims 2 and 3 are patentable.

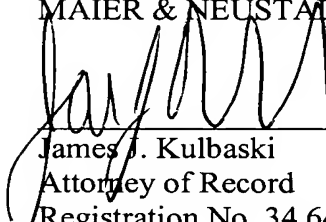
Consequently, in light of the above discussion and in view of the present amendment, the present application is in condition for formal allowance and an early and favorable action to that effect is requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413-2220
(OSMMN 08/07)
JJK/rac



James J. Kulbaski
Attorney of Record
Registration No. 34,648